# Dispensing and Hospital Pharmacy

## 2.1 Prescription, Handling, Incompatibilities, and Adverse Drug Reactions

**A. The Prescription**

A prescription is a written, dated, and signed order from a registered medical practitioner (doctor, dentist, etc.) to a pharmacist to compound and dispense a specific medication for a specific patient.

**Parts of a Prescription:**

- **Prescriber's Information:** Name, address, contact number, and registration number.
- **Patient's Information:** Name, address, age, and sometimes weight (especially for pediatric patients).
- **Date:** The date the prescription was written. This is crucial for legal validity and for assessing the timeliness of treatment.
- **Superscription (Rx):** The symbol "Rx" is an abbreviation for the Latin word *recipere*, meaning "take thou" or "you take." It is the start of the order for the medication.
- **Inscription:** The main body of the prescription. It contains the name of the drug(s), the dosage form (e.g., tablet, syrup), and the strength (e.g., 500 mg).
- **Subscription:** Instructions for the pharmacist. This may include compounding instructions or the quantity to dispense (e.g., "Dispense #30 tablets").
- **Signatura (Sig. or S.):** Instructions for the patient, which the pharmacist must write on the label. It includes how much to take, how to take it, and how often (e.g., "Take one tablet twice a day for 7 days").
- **Prescriber's Signature and Stamp:** The legal signature of the prescriber, which validates the prescription.
    - **B. Proper Handling of a Prescription**
    - This is a systematic process to ensure patient safety and accuracy.
- **Receiving and Verifying:** Receive the prescription from the patient politely. Check its legality and completeness (all parts are present, valid date, prescriber's signature).
- **Reading and Understanding:** Read the entire prescription carefully to avoid misinterpretation. If any part is illegible or ambiguous, contact the prescriber for clarification. **Never guess.**
- **Screening:** The pharmacist professionally screens the prescription for:
    - **Therapeutic Appropriateness:** Is the drug right for the patient's condition?
    - **Correct Dose:** Is the dose appropriate for the patient's age and weight?
    - **Drug Interactions:** Check for potential interactions with other drugs the patient may be taking.
    - **Allergies/Contraindications:** Check if the patient is allergic to the prescribed drug.

- **Preparing and Labeling:** Select the correct drug from the shelf (check name, strength, and expiry date). Accurately count or measure the quantity. Package it in a suitable container and prepare a clear, concise label as per the 'Signatura'.
- **Final Check:** A final check of the dispensed medication against the original prescription should be done (preferably by another pharmacist, if possible) to catch any errors. This is the "right drug, right patient, right dose, right route, right time" check.
- **Dispensing and Counseling:** Hand over the medication to the patient and provide thorough counseling.
    - **C. Incompatibilities**
    - An incompatibility occurs when two or more ingredients of a prescription result in an undesirable physical, chemical, or therapeutic change upon mixing or administration.
- **Physical Incompatibility:** A visible change occurs when substances are mixed, affecting the uniformity or appearance of the preparation.
    - **Examples:**
        - **Immiscibility:** Oil and water in an emulsion separating.
        - **Insolubility:** A solid drug that does not dissolve in the prescribed solvent (e.g., camphor in water).
        - **Precipitation:** A dissolved substance coming out of solution.
- **Chemical Incompatibility:** A chemical reaction occurs between ingredients, leading to the formation of new, often inactive or toxic, compounds. These are often not visible.
    - **Examples:**
        - **Oxidation-Reduction:** Vitamin C (ascorbic acid) can be easily oxidized.
        - **Acid-Base Reactions:** An acidic drug mixed with a basic drug can form a precipitate.
        - **Hydrolysis:** The breakdown of a drug by water (e.g., Aspirin).
- **Therapeutic Incompatibility:** The effect of one drug is modified by another drug administered at the same time.
    - **Pharmacokinetic:** One drug affects the Absorption, Distribution, Metabolism, or Excretion (ADME) of another.
        - **Example:** Antacids (containing calcium/magnesium) reduce the absorption of Tetracycline antibiotics.
    - **Pharmacodynamic:** Two drugs have opposing (antagonistic) or additive effects at the receptor site.
        - **Example:** Combining Warfarin (an anticoagulant) with NSAIDs (like Ibuprofen) greatly increases the risk of bleeding.

**D. Adverse Drug Reactions (ADRs)**

- The WHO defines an ADR as "a response to a drug which is noxious and unintended, and which occurs at doses normally used in man for the prophylaxis, diagnosis, or therapy of disease."

- **Classification:**

    - **Type A (Augmented):** Predictable from the drug's known pharmacology, dose-dependent, and common. (e.g., Bleeding with anticoagulants, drowsiness with antihistamines).
    - **Type B (Bizarre):** Unpredictable, not dose-dependent, and rare. Often related to patient-specific factors like genetics or allergies. (e.g., Anaphylactic shock with penicillin, skin rashes).
- **Pharmacist's Role:** To identify, manage, and report ADRs through the national **Pharmacovigilance** program (e.g., by filling out the "Yellow Form" in Nepal).
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## 2.2 Pharmaceutical Dosage Forms & Dispensing of Preparations

    - **A. Pharmaceutical Dosage Forms**

    - The dosage form is the physical form in which a drug is produced and dispensed, such as a tablet, capsule, or syrup. The form is designed to deliver the drug to the site of action in a safe, effective, and convenient manner.
    - **Classification:**
- **Solid Dosage Forms:**
    - **Tablets:** Solid unit dosage form made by compressing drug powder. (e.g., Paracetamol tablet).
    - **Capsules:** Drug enclosed in a gelatin shell. (e.g., Amoxicillin capsule).
    - **Powders:** A mixture of finely divided drugs and/or chemicals.
    - **Suppositories:** Solid dosage form for insertion into body orifices (rectum, vagina).
- **Liquid Dosage Forms:**
    - **Solutions:** A clear liquid where the drug is completely dissolved in a solvent. (e.g., Oral Rehydration Solution).
    - **Suspensions:** A liquid containing finely divided, undissolved drug particles distributed throughout a vehicle. Must be shaken before use. (e.g., Antacid suspensions).
    - **Emulsions:** A mixture of two immiscible liquids (like oil and water), stabilized by an emulsifying agent. (e.g., Cod liver oil emulsion).
    - **Syrups:** Concentrated aqueous solutions of sugar, with or without a medicinal substance.
- **Semi-Solid Dosage Forms:**
    - **Ointments:** Greasy preparations for external application.
    - **Creams:** Semi-solid emulsions, less greasy than ointments.
    - **Gels:** Semi-solid systems where a liquid is trapped in a network of solid particles.
- **Gaseous/Inhalational Dosage Forms:**
    - **Aerosols/Inhalers:** Drug delivered as a fine mist for inhalation into the lungs. (e.g., Salbutamol inhaler for asthma).
    - **B. Dispensing of Pharmaceutical Preparations**

    - This is the practical act of preparing and providing the medication. The process involves accurate interpretation, preparation, packaging, and labeling. The label is a critical communication tool between the pharmacist and the patient.

- **Essential Information on a Dispensed Medicine Label:**

- Patient's full name
- Name of the medicine (brand and/or generic)
- Strength of the medicine (e.g., 500 mg)
- Clear instructions for use (the 'Signatura')
- Quantity dispensed
- Name and address of the pharmacy
- Date of dispensing
- Any necessary auxiliary labels (e.g., "Shake Well Before Use," "For External Use Only," "May Cause Drowsiness").
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## 2.3 Pharmaceutical Additives (Excipients)

These are pharmacologically inactive substances added to a dosage form to aid in manufacturing, improve stability, ensure effective drug delivery, and enhance patient acceptability.

| Type of Additive | Function | Examples |
|---|---|---|
| **Diluents / Fillers** | Increase the bulk/volume of the dosage form to a practical size. | Lactose, Microcrystalline Cellulose |
| **Binders / Adhesives** | Hold the ingredients of a tablet together. | Starch Paste, Gelatin, PVP |
| **Disintegrants** | Help the tablet break apart in the gastrointestinal tract. | Starch, Croscarmellose Sodium |
| **Lubricants** | Prevent tablet ingredients from sticking to manufacturing equipment. | Magnesium Stearate, Talc |
| **Glidants** | Improve the flow of powder during manufacturing. | Colloidal Silicon Dioxide, Talc |
| **Preservatives** | Prevent the growth of microorganisms in liquid preparations. | Parabens, Benzoic Acid, Sorbic Acid |
| **Coloring Agents** | Improve appearance and aid in identification. | Sunset Yellow, Tartrazine |
| **Flavoring Agents** | Mask unpleasant tastes and improve palatability. | Peppermint, Sucrose, Aspartame |

## 2.4 Roles of Pharmacist in Hospital & Community, Patient Counseling

**A. Roles of a Pharmacist**

**In a Hospital:**

- **Dispensing:** Dispensing medications for in-patients (unit-dose systems) and out-patients.
- **Sterile Compounding:** Preparing sterile products like intravenous (IV) admixtures and Total Parenteral Nutrition (TPN).

- **Drug Information Services:** Acting as a resource for doctors, nurses, and patients on drug-related queries.
- **Clinical Pharmacy:** Participating in ward rounds with the medical team, advising on drug therapy, and monitoring patient outcomes.
- **Inventory Management:** Procuring, storing, and managing the hospital's drug inventory.
- **Pharmacovigilance:** Monitoring and reporting ADRs within the hospital.
- **Drug & Therapeutics Committee (DTC):** Serving as a key member of the DTC, which develops the hospital formulary and treatment policies.

**In the Community:**

- **Dispensing:** Accurately dispensing prescriptions.
- **Patient Counseling:** Providing essential information about medications.
- **Managing Minor Ailments:** Recommending Over the Counter (OTC) medicines for common, self-limiting conditions like colds or minor pain.
- **Health Promotion:** Providing public health services like smoking cessation advice, blood pressure monitoring, and vaccination programs.
- **Triage:** Identifying patients whose symptoms require referral to a doctor.

**B. Patient Counseling**

Patient counseling is a two-way communication process where a pharmacist provides information, advice, and assistance to help a patient use their medications appropriately and safely.

**Key Counseling Points:**

- **Name and Purpose:** What the drug is and what it is for.
- **How and When to Take:** The dose, route, frequency, and duration of treatment (e.g., "Take one tablet by mouth twice a day for 7 days"). Specify if it should be taken with or without food.
- **Common Side Effects:** What to expect and what to do if they occur.
- **Storage:** How to store the medicine properly (e.g., "Store in a cool, dry place," "Keep refrigerated").
- **Missed Doses:** What to do if a dose is missed.
- **Interactions:** Any important food or drug interactions to avoid.
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## 2.5 National Formulary and Hospital Formulary

- **A. Formulary (General)**
- A formulary is a continually revised list of medicines that are approved for use, often reflecting the current clinical judgment of medical experts.

- **B. National Formulary**
- A list of essential medicines selected by a national authority (like the DDA) to meet the priority health needs of the population.

- **Purpose:** To promote rational use of drugs, guide public procurement and supply, and serve as a reference for healthcare professionals.
- **Content:** Contains monographs of selected drugs with essential information like indications, dosage, contraindications, side effects, and precautions.
  - **C. Hospital Formulary**
  - A list of medicines approved for use **within a specific hospital or healthcare system.**
- **Purpose:** To ensure the availability of safe, effective, and affordable medicines that meet the specific needs of the hospital's patient population. It helps control costs and manage inventory.
- **Development:** It is developed and maintained by the hospital's **Drug and Therapeutics Committee (DTC)**.
- **Relationship:** The Hospital Formulary is typically a **subset** of the National Formulary, tailored to the hospital's scope of services, expertise, and budget.
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## 2.6 Standard Treatment Schedules and Rational Use of Drugs

- **A. Standard Treatment Schedules/Guidelines (STGs)**
- STGs are systematically developed statements that assist prescribers in making decisions about appropriate healthcare for specific clinical conditions.

- **Purpose:**
  - To promote rational and consistent prescribing.
  - To ensure high-quality, evidence-based care.
  - To serve as a training and educational tool.
  - To help control healthcare costs by advocating for cost-effective treatments.
- **Example:** An STG for uncomplicated malaria in Nepal would recommend a specific Artemisinin-based Combination Therapy (ACT), outlining the correct drug, dose, and duration.
  - **B. Rational Use of Drugs (RUD)**
  - The WHO (1985) defines RUD as:
  - "Patients receive medications **appropriate to their clinical needs**, in **doses that meet their own individual requirements**, for an **adequate period of time**, and at the **lowest cost** to them and their community."
  - **Key Components of Rational Use:**
- Appropriate Indication
- Appropriate Drug (considering efficacy, safety, and cost)
- Appropriate Dose, Route, and Duration

- Appropriate Patient (no contraindications or allergies)
- Lowest Cost
    - **Common Forms of Irrational Use:**
- **Polypharmacy:** Use of too many medicines.
- Inappropriate use of antibiotics, often for viral infections.
- Overuse of injections when oral formulations would be effective.
- Failure to prescribe in accordance with clinical guidelines.
- Inappropriate self-medication.
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